

# Mobile Monitoring and AIRNow-Tech During the 2008 Northern California Wildfires

---

Prepared by

Alan C. Chan and Timothy S. Dye

Sonoma Technology, Inc.

Petaluma, CA

Jeffrey Cook

California Air Resource Board  
Sacramento, CA

Trent Procter

U.S. Forest Service Region 5  
Vallejo, CA

John E. White, Phillip G. Dickerson, and Scott A. Jackson

U.S. Environmental Protection Agency, AIRNow Program  
Research Triangle Park, NC

Presented at the 2009 National Ambient Air Monitoring Conference  
Nashville, TN  
November 2-5, 2009



# Outline

---

- Introduction
- Mobile monitor deployment
- AIRNow-Tech
- Use of data
- Particulate matter monitoring considerations
- Aftermath



Basin Complex 2008

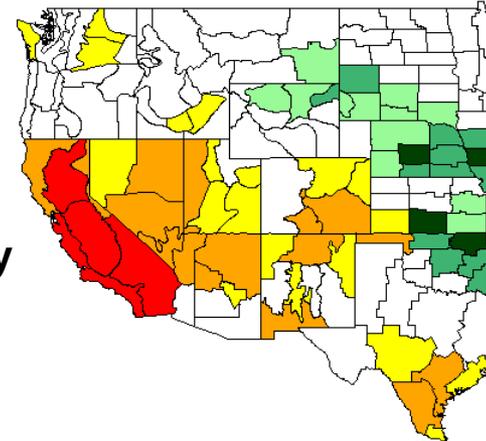


Indians Fire 2008

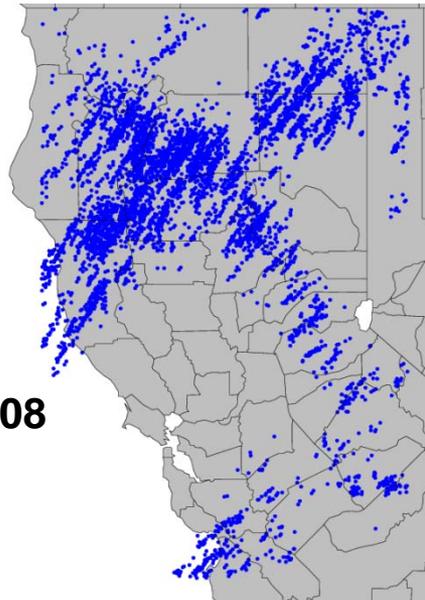
# Introduction (1 of 2)

## How the season started

Much **below average** precipitation February through June 2008



Lightning strikes: more than 6,000 on June 20-21, 2008



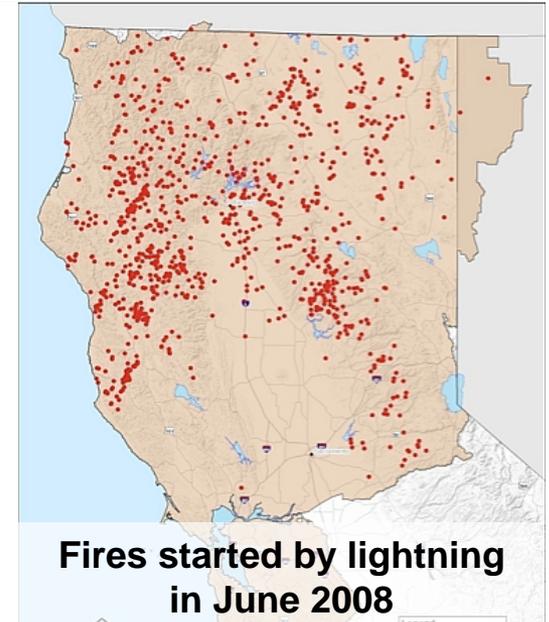
Radar composite reflectivity at 21:25 on June 20, 2008, showing lightning and precipitation



# Introduction (2 of 2)

## Summary of fires

- 1 million+ acres burned
- 2,000+ individual fires burning at the same time
- 25,000+ firefighters
- Thousands of tons of PM<sub>2.5</sub> emitted each day
- Millions of people affected by smoke
- **Unhealthy** to **Hazardous** AQI levels observed (ozone and PM<sub>2.5</sub>)



June 23, 2008 6PM (PDT)

Site Name	Current Ozone AQI	Max Ozone AQI (PDT)
Cool	127	127 at 6PM
Davis	40	74 at 2PM
Elk Grove	71	87 at 4PM
Folsom	189	230 at 5PM
Grass Valley	104	104 at 6PM
North Highlands	48	48 at 5PM
Placerville	177	177 at 6PM
Roseville - N.Sunrise/Douglas	137	140 at 5PM
Sacramento - Airport Road	50	132 at 3PM
Sacramento - Del Paso Manor	11	16 at 5PM
Sacramento - T Street	51	104 at 2PM
Sloughhouse	122	147 at 3PM
Yacaville	38	45 at 5PM
Woodland	49	90 at 4PM
Yuba City	47	47 at 6PM

Source: [www.sparetheair.com](http://www.sparetheair.com)

# Mobile Monitor Deployment (1 of 5)

## Motivation

- Fires and widespread regional air quality impacts were expected to continue for weeks or months
- Supplement to existing air quality monitoring network needed to assess wildfire impacts

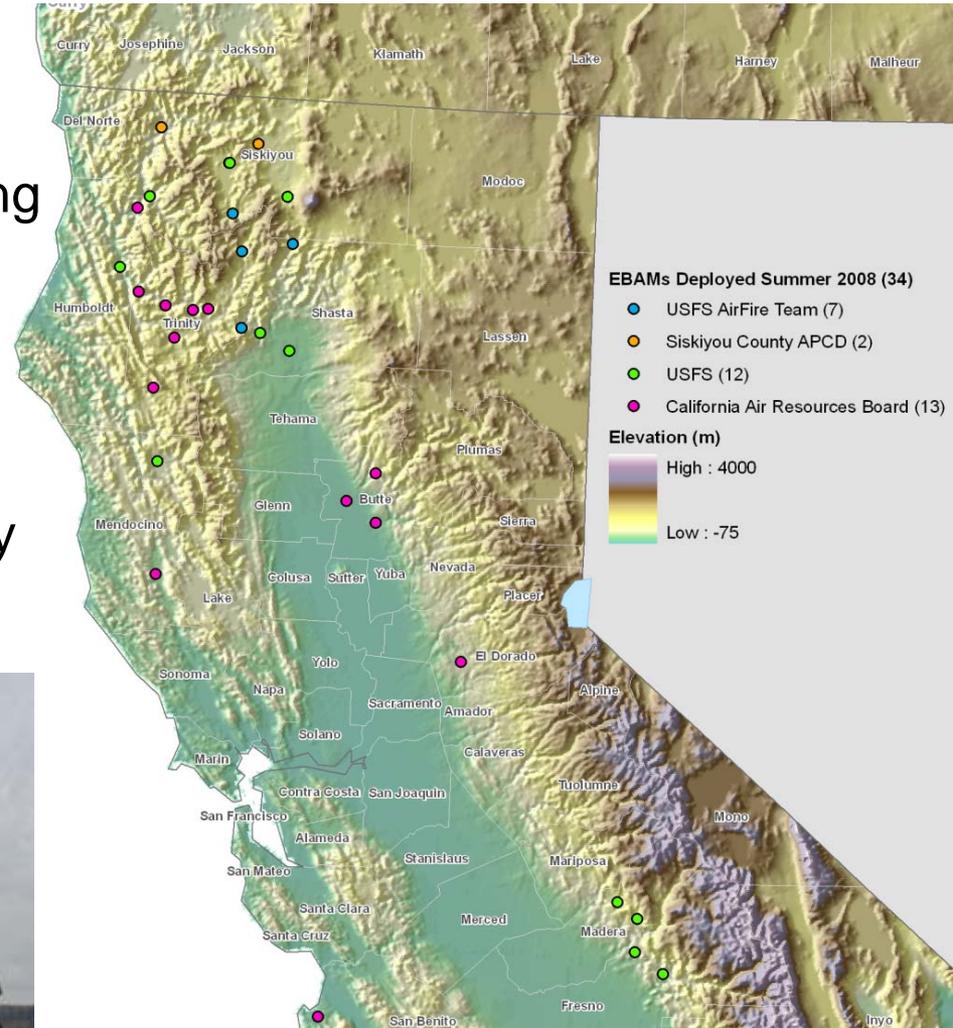


**Smoke on July 11, 2008**

# Mobile Monitor Deployment (2 of 5)

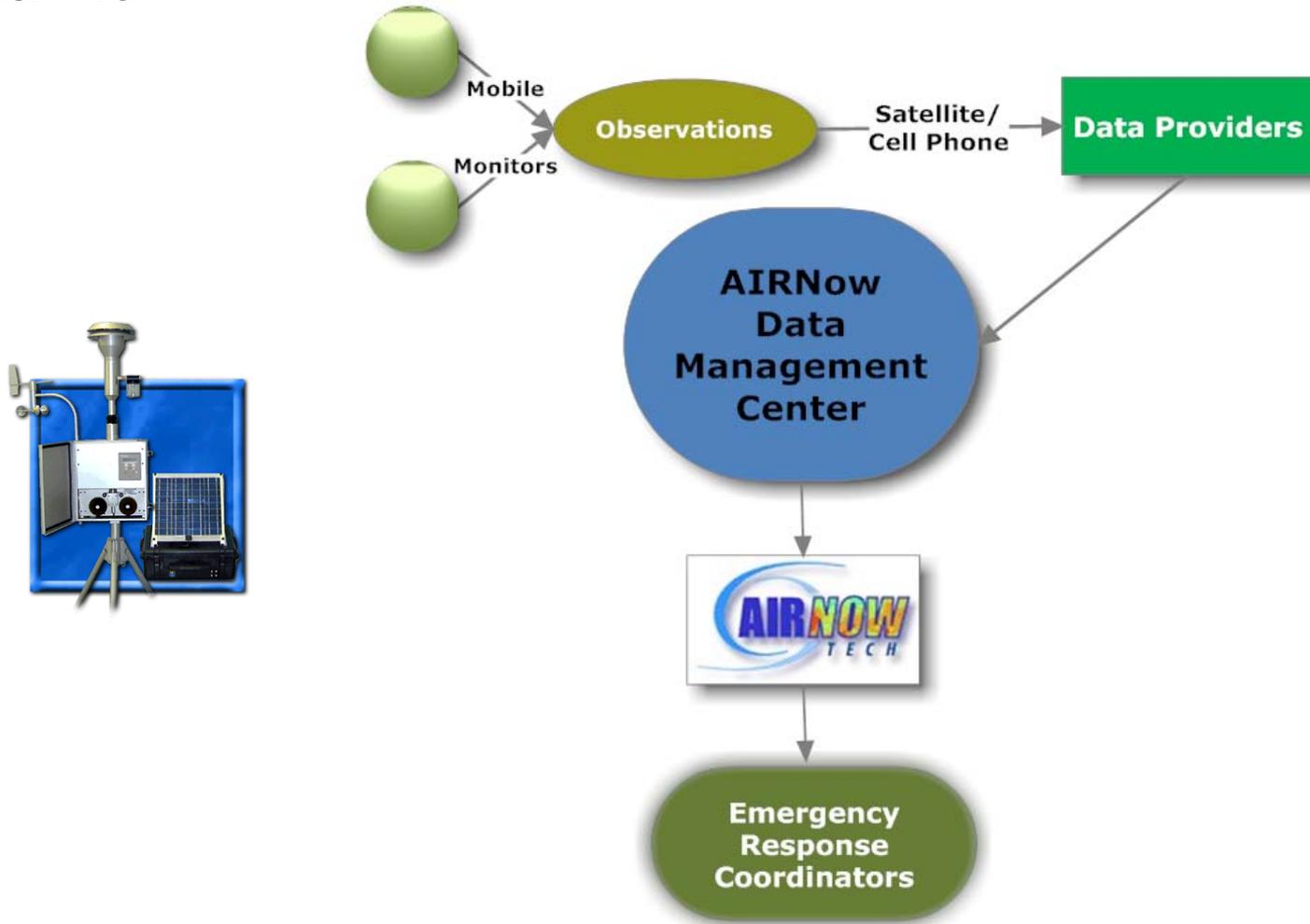
## Purpose

- Focus on areas of Northern California with sparse monitoring coverage
- Assess smoke impact
- Support fire management and incident command teams
- Provide resources for air quality agencies



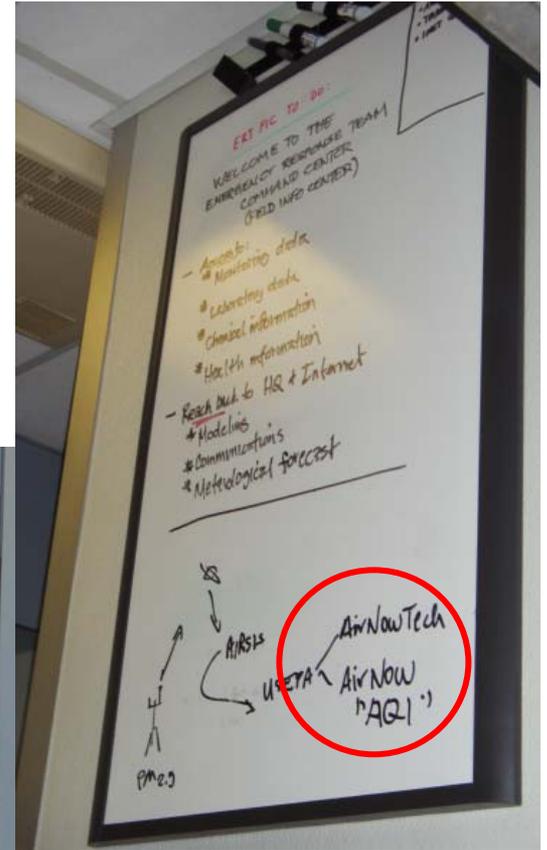
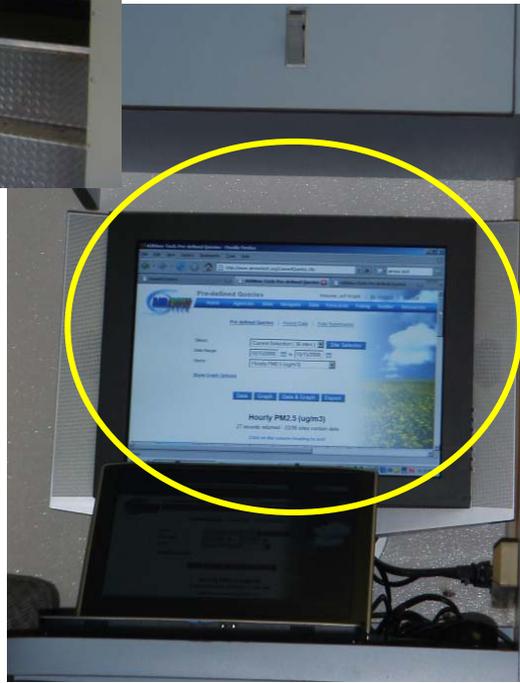
# Mobile Monitor Deployment (3 of 5)

## Data Flow





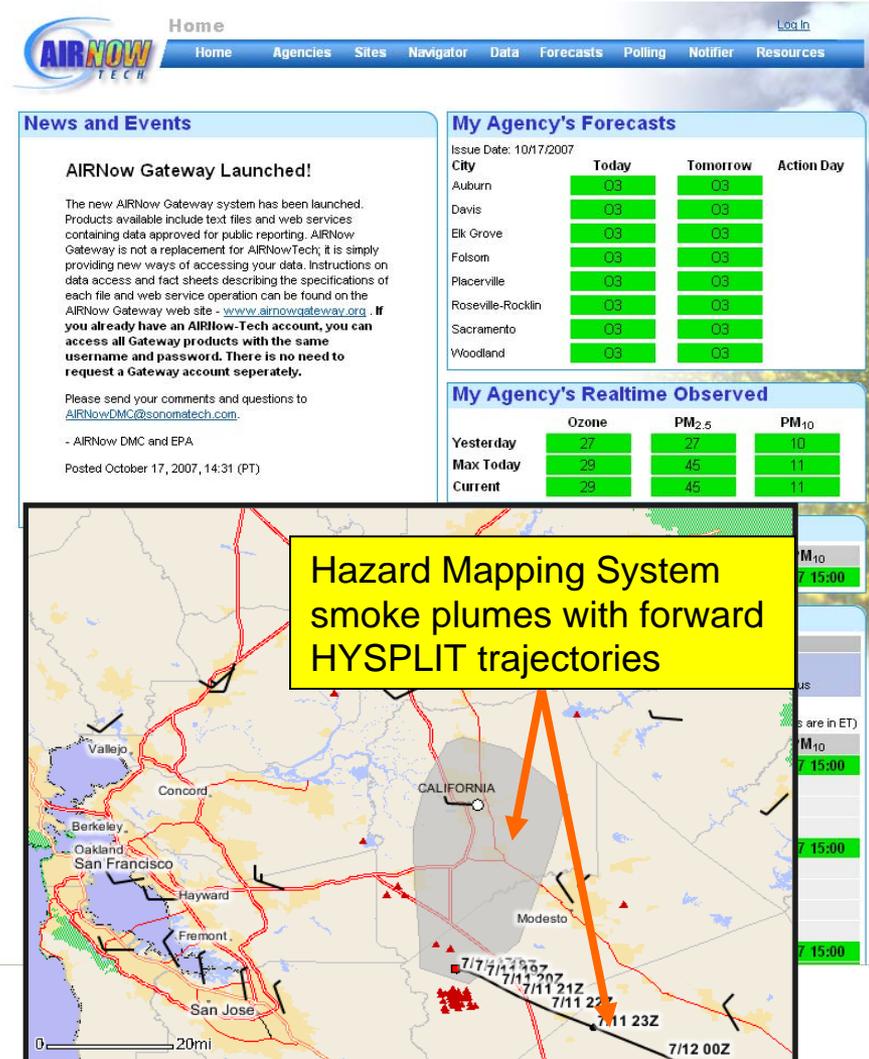
# Mobile Monitor Deployment (5 of 5)



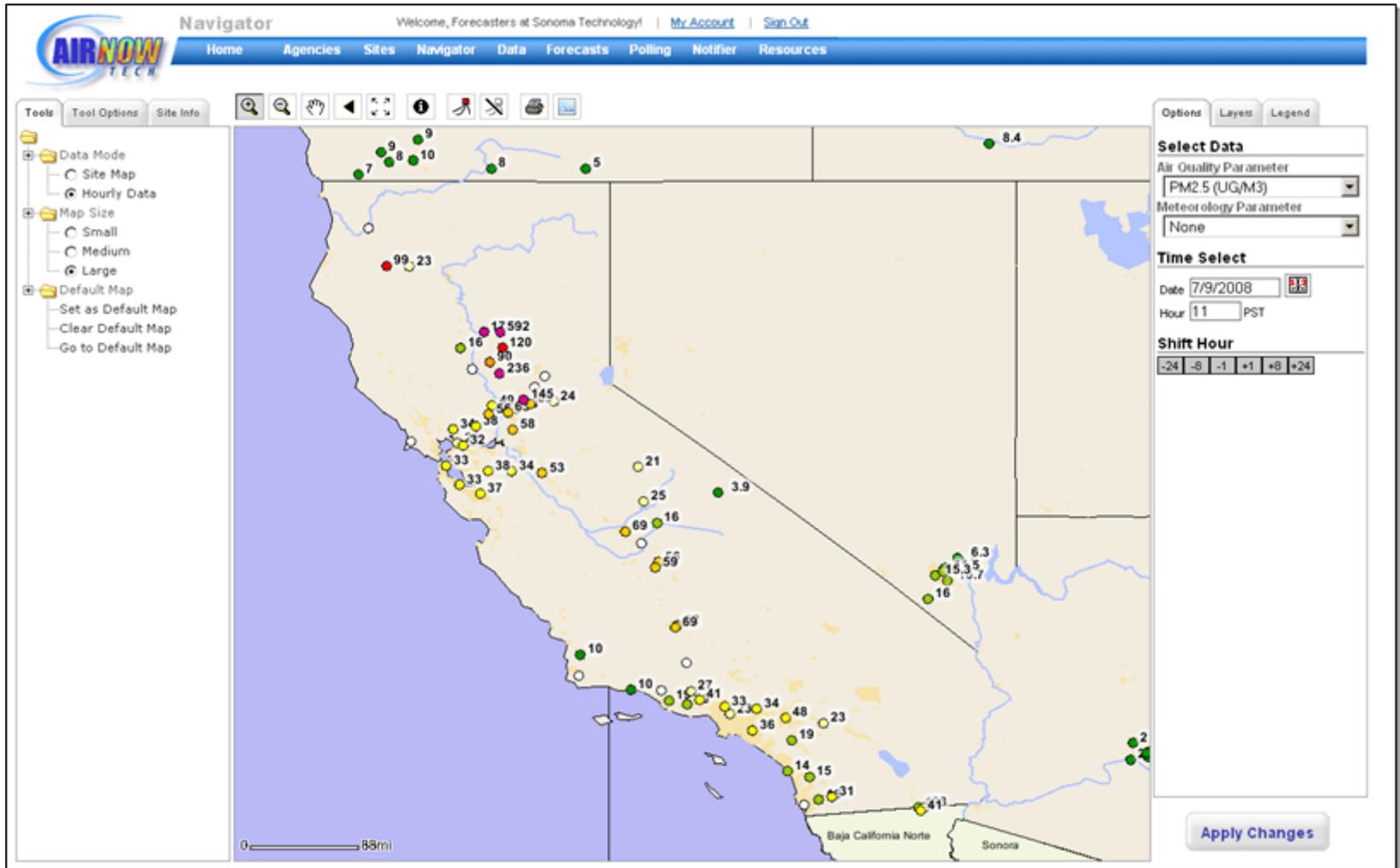
# AIRNow-Tech (1 of 5)

## AIRNowTech.org

- Decision Support System – management and analysis tool for the AIRNow Program
- GIS functions – HYSPLIT trajectory tool, satellite, and smoke products
- Data queries, personalized tools, preferences, and services
- Ability to view meteorological and air quality data

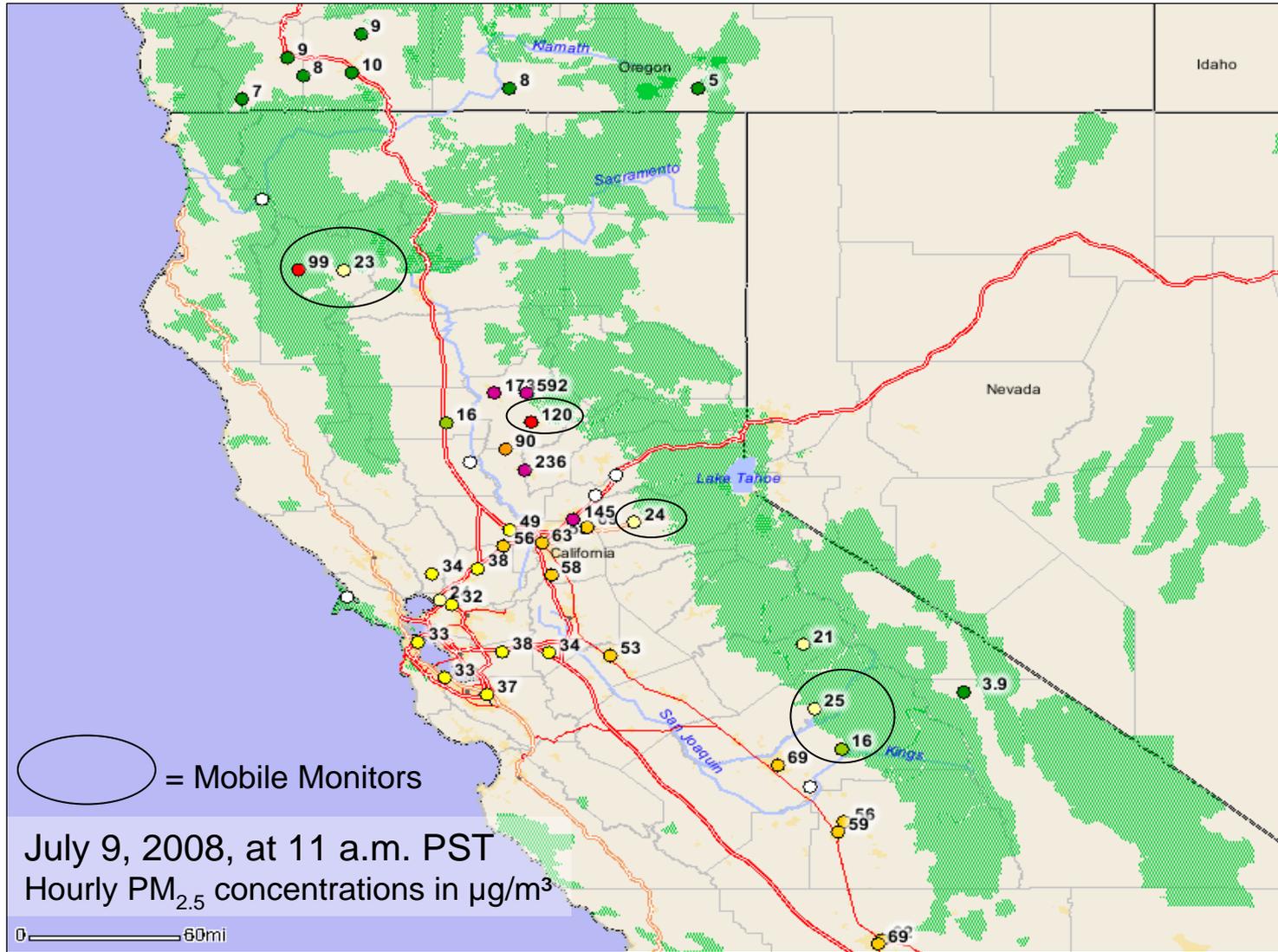


# AIRNow-Tech (2 of 5)

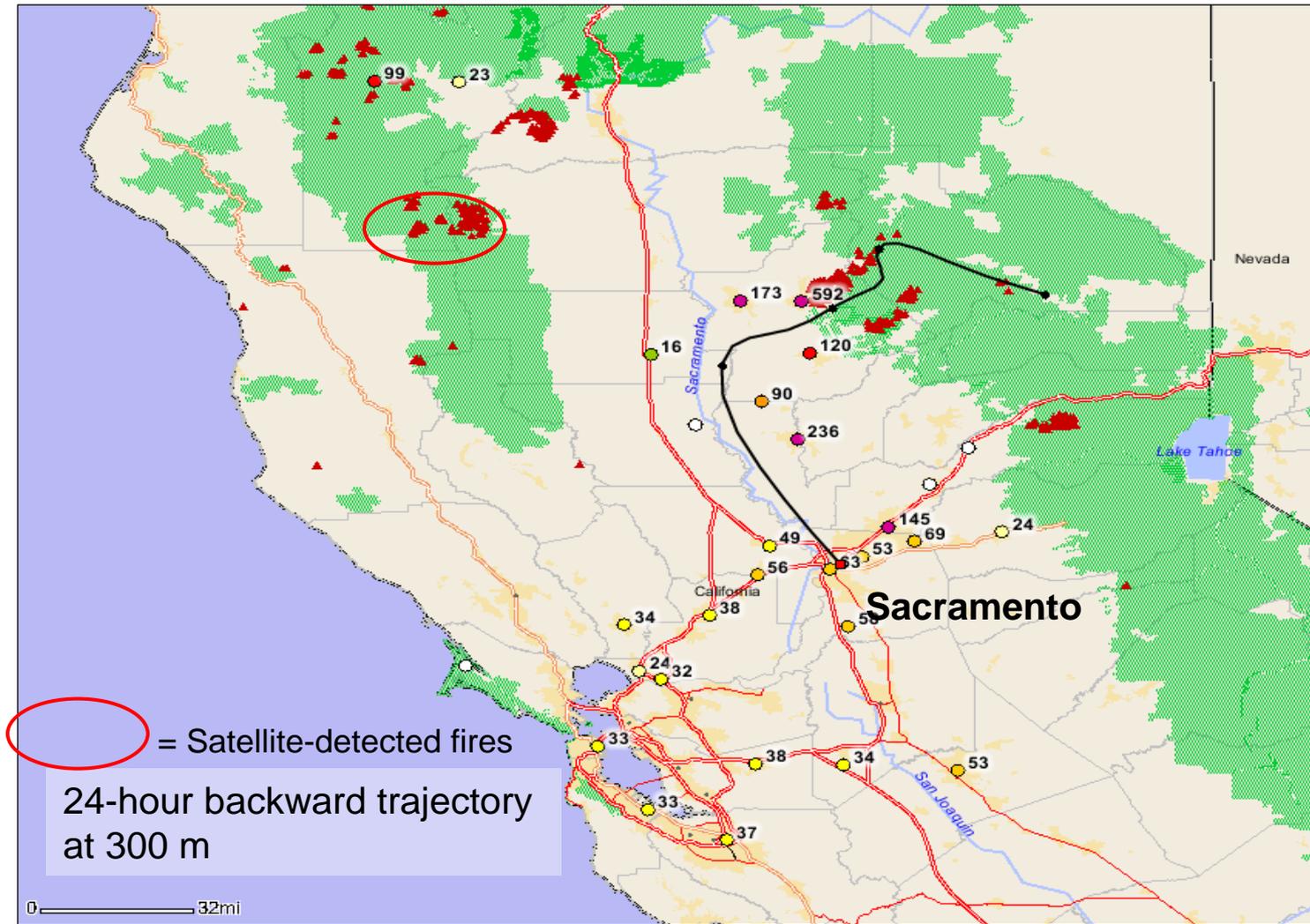


PM<sub>2.5</sub> concentrations in  $\mu\text{g}/\text{m}^3$  in AIRNow-Tech's Navigator

# AIRNow-Tech (3 of 5)



# AIRNow-Tech (4 of 5)



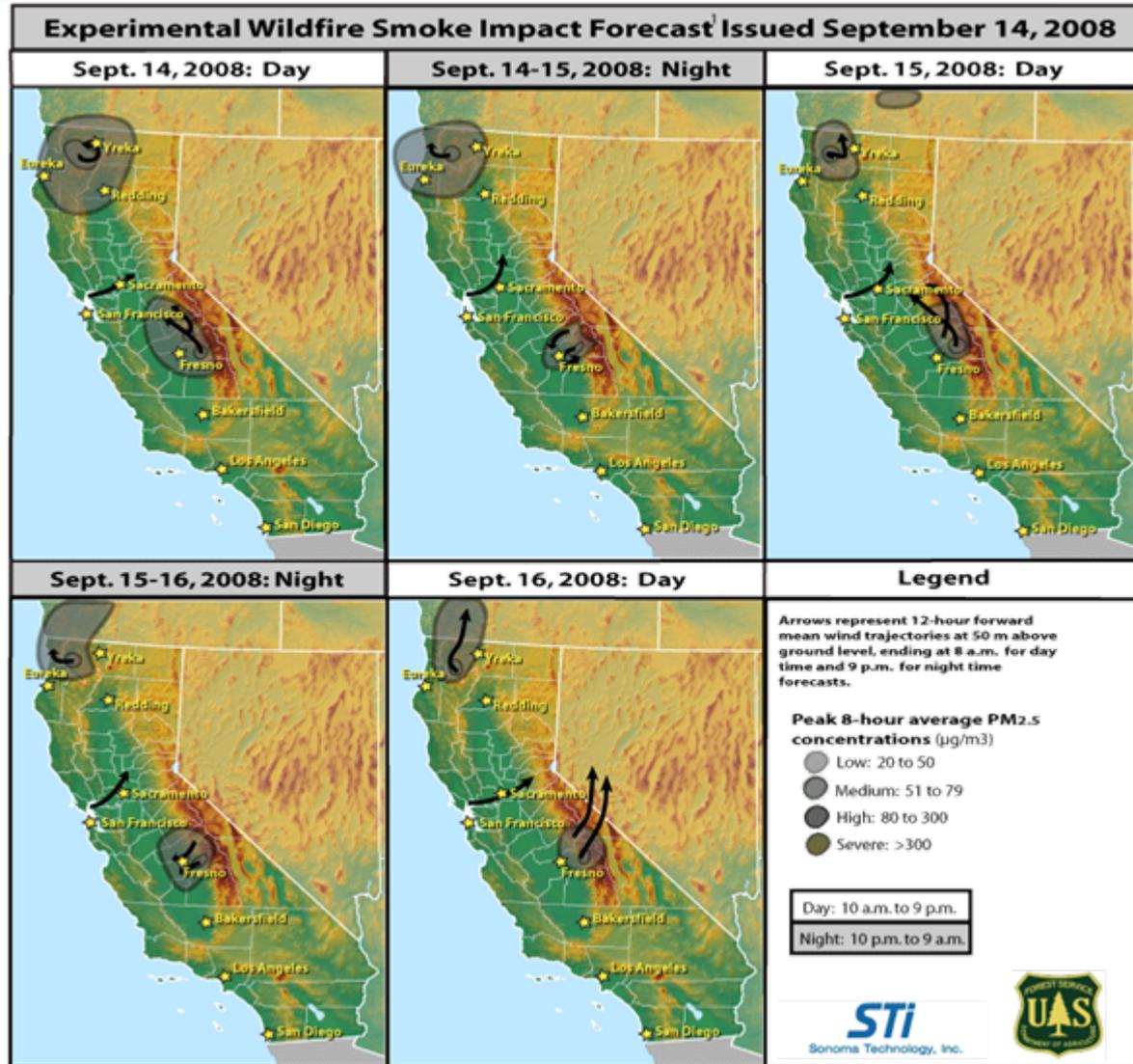
Backward trajectory showing where Sacramento's air came from during the last 24 hours

# AIRNow-Tech (5 of 5)



# Use of Data (1 of 2)

- USFS Emergency Smoke Response Systems
- Smoke impact forecasting – daily map and forecast discussions
- Outreach – air quality advisories
- Press releases



# Use of Data (2 of 2)

Press Release: 2008-07-08 Health advisory for Northern California - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.arb.ca.gov/newsrel/nr062308b.htm

California Environmental Protection Agency  
**NEWS RELEASE**  
Air Resources Board

Release 08-58  
**FOR IMMEDIATE RELEASE**  
August 18, 2008

Dimitri Stanich  
(916)322-2625  
www.arb.ca.gov

Health advisory for Northern and Central California

**Wildfires in Northwest California  
Keep Air Quality Index in the Unhealthy to Very Unhealthy Range**

**SACRAMENTO** -- Poor air quality continues to plague the northwestern counties of California as the wildfires create very unhealthy conditions. Parts of eastern Humboldt unusually persistent smoky days this week. Governor Arnold Schwarzenegger declared a state of emergency ([link](#)) in Humboldt County on August 6, 2008, "as a result of unprecedented smoke conditions and unhealthy air quality." Residents are urged to take all necessary precautions to protect their health. The North Coast Unified Air Quality Management District has again issued health advisories for its local communities.

Particulate monitors are located in Orleans, Big Bar, Junction City, Ruth, Hayfork, Weaverville, Ft. Jones, Somes Bar, and Willow Creek. These serve as the basis for the health advisories.

**Experimental Smoke Impact Forecast for California: August 18, 2008**

August 18, 2008	August 19, 2008	August 20, 2008

Arrows represent 24-hour forward mean wind trajectories at 50 m above ground level, ending at midnight each day.

The graphic above is a depiction of the breadth and relative concentration of the smoke plume forecast for a three-day period. It was generated by an experimental smoke model by the US Forest Service using known and projected aspects of fire behavior, terrain, and the weather. If you have any comments, questions, or suggestions about the model output, please contact Mr. Trent Proctor, of the USFS at 559-784-1500 x1114, or email him at [tproctor@fs.fed.us](mailto:tproctor@fs.fed.us).

The Air Resources Board and numerous local air quality agencies in Northern California recommend individuals in areas with 'Unhealthy' air quality indexes suspend outdoor activities. For information on air quality in your area go to [www.Airnow.gov](http://www.Airnow.gov) and use the drop down menu to select California, or go to the North Coast Unified AQMD web site at [www.ncuaqmd.org](http://www.ncuaqmd.org).

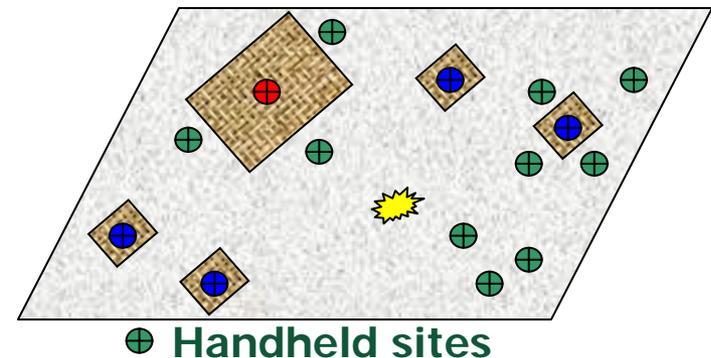
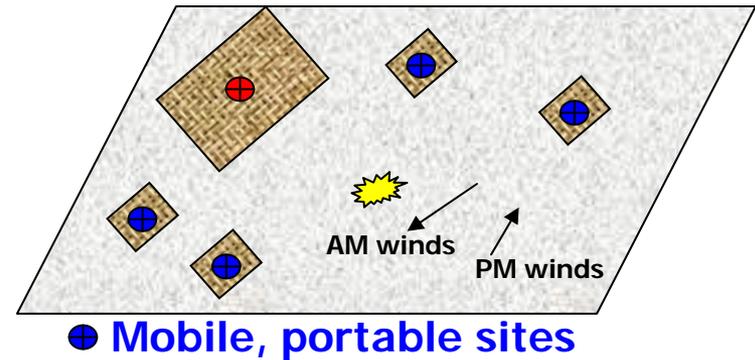
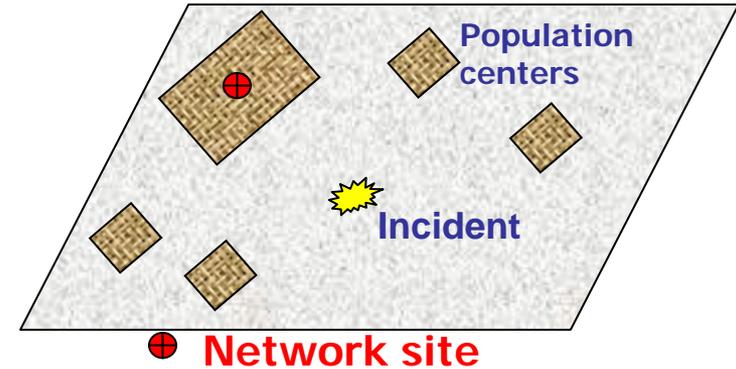
The following pictures, from different vantage points, were provided by the North Coast district of the Hoopa Valley earlier this month and demonstrate how visibility can help determine the health category at the moment.

Done

California Air Resources Board used graphic in news release on August 18, 2008 (<http://www.arb.ca.gov/newsrel/nr062308b.htm>).

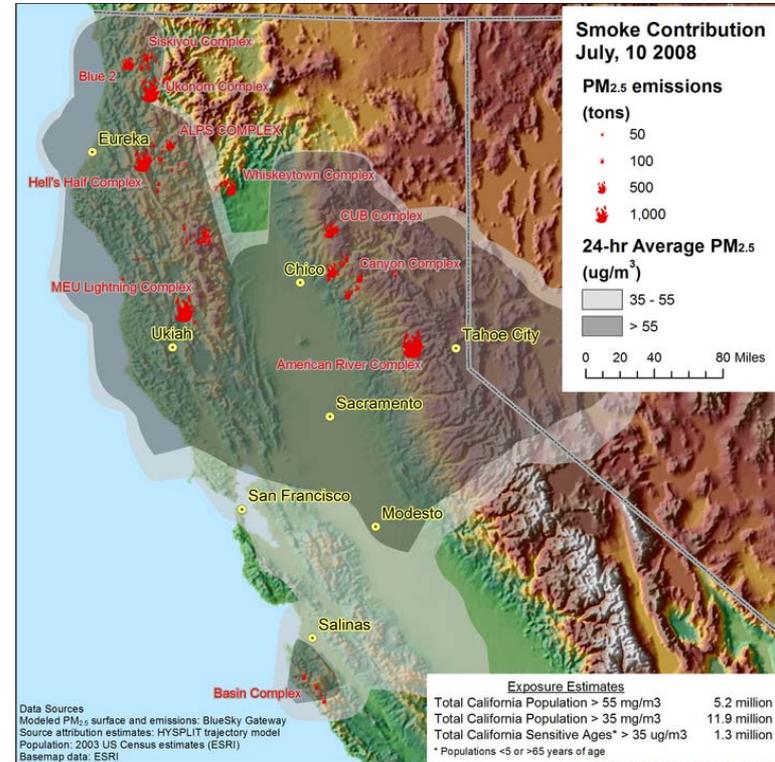
# Particulate Matter Monitoring Considerations During Emergency Response

- Monitoring in populated areas
  - Representative of local population
    - Senior centers, schools and day care centers, evacuation centers, town center, residential areas, incident command units
  - Diurnal winds patterns
- Operational considerations
  - Power, security, troubleshooting (all systems), periodic maintenance
- Maintain reserve
  - Back-up, unexpected questions
- Layered approach



# Aftermath

- California Air Response Planning Alliance Summit – outreach and emergency response personnel to discuss air quality issues during air emergencies
- Increased participation of Northern California air quality agencies in AIRNow
- Fire Impact Potential analysis
- Fire almanac in production as a reference for next fire season



**Primary sources of smoke at selected locations (estimated percentage)**

Fire or Complex	Chico	Eureka	Modesto	Sacramento	Salinas	SF	Tahoe	Ukiah
Hell's Half Complex		2	52	18		5		26
Basin Complex					97			
Ukonom Complex		18				57		17
Canyon Complex	50	1		7			30	
CUB Complex	47	1		26		6	7	
MEU Lightning Complex			15	32				32
American River Complex							58	
Blue 2		37				9		5
Badger Mountain, WA		26				10		
Alps Complex		1	15	5		6		9
Siskiyou Complex		12				3		1
Whiskeytown Complex	3		7	3			1	2



# Questions?

---

John White: [white.johne@epa.gov](mailto:white.johne@epa.gov)

Scott Jackson: [jackson.scott@epa.gov](mailto:jackson.scott@epa.gov)

Tim Dye: [dye.tim@epa.gov](mailto:dye.tim@epa.gov)

Alan Chan: [chan.alan@epa.gov](mailto:chan.alan@epa.gov)

AIRNow Data Management Center

[AIRNowDMC@sonomatech.com](mailto:AIRNowDMC@sonomatech.com)

707.665.9900